INFILTRATION TRENCH (INF)

Revised November 29, 2001

A. Facility Description

The infiltration trench system design is derived from the 1984 version of MDE/ MDDNR "Standards and Specifications for Infiltration Practices" and has been revised for use in Montgomery County. Infiltration is one of the preferred methods of water quality control in Montgomery County. It filters the stormwater runoff via slow infiltration and replenishes the groundwater supply. Urban land uses that produce higher loads of metals and toxic chemicals are considered stormwater hotspots. Soluble pollutants, such as chloride, nitrate, copper, dissolved solids and some polycyclic aromatic hydrocarbons (PAH's) can migrate into groundwater and potentially contaminate wells. Infiltration should not be used in hotspot areas.

The following criteria are minimum requirements for infiltration soil testing:

B. Soil Suitability

1. Field Investigation

a. To be performed by boring or open excavation.

b. Soil description to include all soil horizons.

c. Soil textures to be identified according to USDA and Unified Soil Classification.

d. Soil boring depth shall extend at least 4 feet below the bottom of the proposed trench in order to ensure the facility is separated from seasonal high groundwater or bedrock by at least 4 feet.

e. Groundwater elevations are to be recorded at the time of boring and after 24 hours. Based on this information, the seasonal high groundwater table shall be determined.

f. Borings are not required in soils mapped as Hydrologic Soil Group C or D, since their established slow infiltration rate and/or high water table make infiltration infeasible.

2. Geotechnical Study

a. Grain-size sieve analysis and hydrometer tests shall be employed for determining the USDA and Unified soil texture classifications.

b. Actual infiltration rates shall be determined via conducting a percolation test 24 inches below the trench bottom. Percolation tests shall be performed in a separate boring hole adjacent to the initial soil test hole. MCDPS does not accept a percolation test under constant head, because infiltration trenches do not function with constant head. Additional requirements are as follows:

- Install a casing (5 inches diameter, 30" length) to 24" inches below proposed bottom of trench;

- Fill standpipe with water to a depth of 2 feet and allow to pre-soak for 24 hours. Twenty four hours later, refill standpipe to a depth of 2 feet and

monitor water level for 4 hours on the hour. Use the average as the actual rate. The final rate shall be reported in inches per hour.

- Should the infiltration rates prove inconsistent, additional percolation tests must be performed.

c. Soil boring locations must correspond with the proposed location of the infiltration trench.

d. A minimum of one boring for every 50 linear feet of infiltration trench or 400 square feet of trench, whichever is most limiting, is required.

e. Soil boring location stakes are to be left in the field for DPS inspection.

f. Soils investigation shall be performed by a licensed soils or geotechnical engineer.

g. A change in design at the permitting plan review stage may necessitate additional testing.

h. Septic percolation tests are not acceptable.

Note, an infiltration rate of between 0.5 inch per hour and 6 inches per hour must be obtained for infiltration to be considered feasible. Infiltration rates above 6 inches per hour (considered rapid by the NRCS Soil Survey), are not acceptable.

C. Site Suitability/ Limitations

a. Infiltration systems must be located at least 20 feet (horizontal distance) from basement walls.

b. Infiltration trench must not be placed on slopes greater than 15 percent, or within fill soils.

c. The infiltration trench must not be placed at a location which could cause water problems in down grade properties.

d. Infiltration systems shall be located a minimum of 100 feet from any water supply well.

e. Underground or “buried infiltration” is strongly discouraged by DPS due to the difficulty of inspection and maintenance. If underground infiltration is proposed, structural water quality pretreatment will be required. Underground infiltration systems shall not be located under parking areas.

f. Infiltration trenches shall not be utilized as an integral part of the main conveyance system.

D. Materials

a. Trenches shall be filled with 1.5-3.0 inch diameter double washed stone meeting ASTM D448, Size No. 1 and capped with a 12” thick layer of washed pea gravel.

b. Provide approved filter cloth (Mirafi 140N or approved equivalent) on the sides of trench and on the top layer of stone aggregate to separate the 12” pea gravel layer. Do not place any filter material on the bottom of the trench.

c. Provide a 6-inch layer of clean, washed coarse sand (meeting ASTM C-33 fine aggregate concrete sand specifications) on the bottom of the trench. Manufactured sand or stone dust is not allowed.

d. Pea gravel must be AASHTO M-43, #8 natural pea gravel, uncrushed.

E. Trench Design Criteria

1. Surface infiltration trench systems require a minimum 20-foot long pre-treatment grass filter prior to runoff entering the trench. The required grass filter length shall be determined by multiplying the Water Quality Volume (WQV) by 0.01. For example, if the (WQV) is 3,000cu.ft., then:

   3,000 cu. ft. (0.01)= 30 LF grass pre-treatment required.

   Where high suspended solid loads are anticipated, such as from high traffic volume catchment areas, a minimum 50-foot long pre-treatment grass filter strip will be required. If site constraints preclude grassed pretreatment, structural pretreatment must be proposed.

2. All dimensions of the trench shall be shown on the detailed plan sheet. Provide adequate information, inverts, elevations and dimensions as necessary for all pipe and trenches.

3. A minimum 5-foot horizontal distance shall be maintained between any utility line and an infiltration trench. No utility line should be placed over, under or within the infiltration trench.

4. One observation well, with a tamper proof cap, is required for each 500 square feet of trench.

5. Infiltration systems shall not receive any runoff until the entire contributory drainage area to the infiltration system is permanently stabilized and approved by the DPS inspector.

F. Infiltration Trench Sizing Calculations

Infiltration trenches are to be sized as follows:

The stone reservoir portion of the trench should be located in a lawn-type area. The maximum allowable depth of trench (Dmax) shall not exceed 8 feet. Use the following simplified equation to calculate the Dmax :

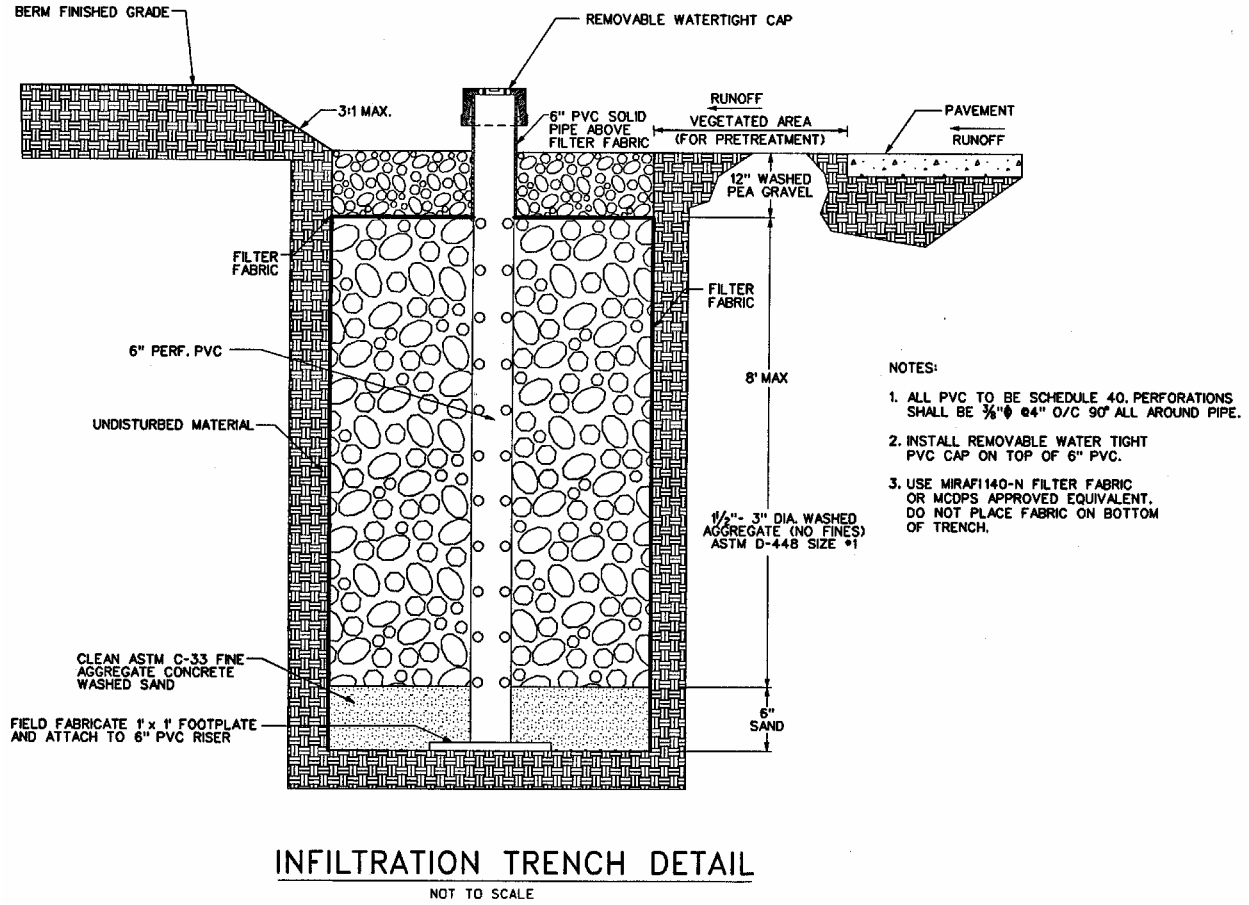
Dmax = 10(f in/hr)

Where f is the final infiltration rate of the trench area in inches per hour. The calculation assumes a 48 hour maximum storage time and a 40% void ratio in the stone reservoir. For example, an in situ percolation rate of .6 in/hr would have a Dmax equal to 6 feet with the above equation. An in situ percolation rate of 1.5 in/hr would result in a Dmax of 15 feet. Therefore, use a Dmax of 8 feet.

The Trench must be sized to provide storage for the full treatment volume (WQV).
In order to arrive at the required trench volume, a 40% void ratio must be applied to the required WQV.

Trench volume = WQV(2.5)

EXAMPLE:
An infiltration trench must be sized to provide 3,000 cu. ft. of storage.
WQV = **3,000 cu.ft.**
To determine the trench volume required to store the WQV with a void ratio of 40%:
Trench Volume = WQV(2.5) =3,000(2.5) = **7,500 cu. ft.**
Required pretreatment length is determined as:
WQV(0.01) = 3,000(0.01) = **30 LF**



INFILTRATION TRENCH DETAIL

NOT TO SCALE